Serial No. 09/524,408
Docket No. YO999-598

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method of ~~applying transforms for simultaneously~~ modifying a plurality of domains of a circuit, including at least one of a Boolean domain, an electrical domain, and a physical ~~domain, concurrently~~ domain in a design space, said method comprising:

selectively applying a set of ~~less-to-more granular~~ steps of placement and netlist modification transforms ~~separately or~~ in a flexible sequence, each transform including a plurality of steps,

evaluating the impact of the sequence of the set of steps of the modification transforms on the design space,

rejecting evaluated ~~transforms~~ sequences that do not improve the design space, and

repeating the above to create a ~~converging~~ design process ~~flow,~~ flow to meet design performance targets.

~~wherein said transforms comprise fine-grained steps to optimize the netlist and placement properties of a design.~~

2. (Currently amended) The method according to claim 1, wherein ~~said creating~~ the selectively applying starts from a netlist without an initial placement of said ~~circuit~~ netlist on a chip or from a netlist with an initial placement.

3. (Currently amended) The method according to claim 1, wherein said placement and netlist modification transforms are ~~decomposed~~ divided into a set of ~~fine-grained transforms~~

steps each addressing a specific phase of the placement and synthesis process.

4. (Currently amended) The method according to claim 3, wherein ~~said~~ steps of the placement transforms are selectively mixed and matched with ~~predetermined~~ steps of logic synthesis transforms, ~~and fine-grained transforms.~~

5. (Currently amended) The method according to claim 1, wherein a single ~~transform~~ sequence of sets of steps of the transforms optimizes the combination of the physical, Boolean and electrical domains, thus moving the design from a start point to an end point in the design space.

6. (Currently amended) The method according to claim 1, wherein a single ~~fine-grained transform includes~~ sequence of sets of steps of the transforms affects multiple objectives and constraints which involve physical placement, electrical properties, and logical data.

7. (Currently amended) The method according to claim 1, wherein a partially placed and synthesized design is a starting point of said ~~creating~~ method.

8. (Currently amended) The method according to claim 1, wherein said design process flow comprises a single ~~converging~~ flow of successive application of ~~fine-grained operations~~ a set of steps of the transforms until design performance targets are met.

9. (Currently amended) The method according to claim 1, further comprising utilizing an infrastructure of bins, and wherein a ~~timing,~~ congestion ~~and noise~~ analysis is based on the bins.

10. (Currently amended) The method according to claim 1, wherein placement and netlist changes are performed ~~together~~ in said ~~fine-grained~~ transforms.

11. (Currently amended) The method according to claim 1, wherein said ~~fine-grained~~ transforms are organized together in flexible scenarios to achieve a design closure process.

12. (Currently amended) The method according to claim 1, further comprising:
at predetermined stages of the process, selectively determining whether to intercept the process and implement any of a plurality of ~~fine-grained~~ transforms.

13. (Currently amended) The method according to claim 1, further comprising:
examining a plurality of domains ~~concurrently in finding an optimum~~ to find an improved design, said examining comprising creating a sequence of ~~less-to-more-granular~~ steps of placement and netlist modification transforms, to create a ~~converging~~ design closure process meeting design performance targets.

14. (Original) The method according to claim 1, wherein all transforms have a unified view of the placement and synthesis design space.

15. (Currently amended) The method according to claim 14, wherein synthesis, timing, and placement data are concurrently available to all of said transforms, such that said transforms modify a netlist and placement ~~concurrently.~~

16. (Currently amended) A method of applying ~~fine-grained~~ transformations during placement synthesis interaction, said method comprising:

(a) creating and updating bins;

(b) applying a plurality of transforms on a bin-based database updated by both placement and synthesis, each transform including a plurality of steps;

(c) updating the bin-based timing, and invoking a synthesis-placement ~~script~~ scenario;

(d) selecting ~~fine-grained~~ synthesis and placement transforms;

(e) invoking steps of selected transforms within said ~~script~~ scenario using a driver; and

(f) applying transforms that change the physical, electrical and Boolean logic design space ~~concurrently.~~

17. (Currently amended) The method according to claim 16, further comprising:

repeating (a) through (f) until design ~~convergence is achieved~~ performance targets are met.

18. (Currently amended) The method according to claim 16, wherein a design space is

moved from one point to another by considering ~~concurrently~~ subsets of ~~fine-grained~~ Boolean transforms, electrical transforms, and physical transforms.

19. (Currently amended) The method according to claim 18, wherein ~~blocks~~ steps of the transforms are interspersed sequentially.

20. (Currently amended) The method according to claim 19, wherein each of said transforms is represented as a plurality of transformations such that the transforms are divided into steps and the steps are interspersed sequentially, to examine and improve each of the Boolean, electrical and physical domains. ~~concurrently.~~

21. (Currently amended) A method for applying ~~fine-grained~~ transformations during placement synthesis interaction, said method comprising:

~~creation~~ creating and updating ~~of~~ bins;

applying the transforms on a bin-based database updated by both placement and synthesis;

updating the bin-based timing;

invoking a synthesis-placement script based on said placement and said synthesis;

selecting ~~fine-grained~~ synthesis and placement transforms;

invoking selected transforms within said synthesis-placement script;

applying transforms that change the physical, electrical and Boolean space; ~~concurrently;~~ and

repeating the above until design ~~convergence is achieved~~ performance targets are met.

22. (Currently amended) A system ~~for applying transforms~~ for modifying a plurality of domains ~~concurrently~~ in a design space, said ~~method~~ system comprising:

a unit for ~~creating~~ selectively applying a sequence of steps of ~~less-to-more granular~~ placement and netlist modification transforms, each transform including a plurality of steps,

a unit to evaluate the impact of the sequence of steps of the modification transforms on the design space and to reject evaluated ~~transforms~~ sequences that do not improve the design space to create a ~~converging~~ design process flow meeting design performance targets,

wherein said transforms ~~are fine-grained transforms allowing~~ allow selective mixing and matching of ~~said fine-grained~~ the steps of the transforms to optimize the placement of a circuit in a design space.

23. (Currently amended) The system according to claim 22, wherein said unit for ~~creating~~ selectively applying starts from a netlist without an initial placement of said ~~circuit~~ netlist on a chip, or from a netlist with an initial placement.

24. (Currently amended) The system according to claim 22, wherein said placement and netlist modification transforms are ~~decomposed~~ divided into a set of ~~fine-grained transforms~~ steps each addressing a specific phase of the placement and synthesis process.

25. (Currently amended) The system according to claim 24, wherein steps of said

placement transforms are selectively mixed and matched with ~~predetermined~~ steps of logic synthesis transforms. ~~and fine-grained transforms.~~

26. (Currently amended) The system according to claim 22, wherein a single ~~transform~~ set of steps of the transforms optimizes the combination of the physical, Boolean and electrical domains, thus moving the design from a start point to an end point in the design space.

27. (Currently amended) The system according to claim 22, wherein a single ~~fine-grained transform~~ set of steps of the transforms includes multiple objectives and constraints which ~~involve~~ affect physical placement and logical data.

28. (Currently amended) The system according to claim 22, wherein a partially placed and synthesized design is a starting point for said unit for ~~creating~~ selectively applying.

29. (Currently amended) The system according to claim 22, wherein said design process flow comprises a single ~~converging~~ flow of successive application of ~~fine-grained operations~~ a set of steps of the transforms resulting until design performance targets are met.

30. (Currently amended) The system according to claim 22, further comprising an infrastructure of bins, and wherein a ~~timing,~~ congestion ~~and noise~~ analysis is based on the bins.

31. (Currently amended) The system according to claim 22, wherein placement and netlist changes are performed ~~together~~ in said ~~fine-grained~~ transforms.

32. (Currently amended) The system according to claim 22, wherein said ~~fine-grained~~ transforms are organized together in flexible scenarios to create a design closure process.

33. (Currently amended) The system according to claim 22, further comprising:

~~a unit, at predetermined stages of the process, for~~ a unit for selectively determining, at predetermined stages of the process, whether to intercept the process and implement any of a plurality of ~~fine-grained~~ transforms.

34. (Currently amended) The system according to claim 22, further comprising:

an examining unit for examining a plurality of domains ~~concurrently in finding an optimum~~ to find an improved design, said examining unit comprising a unit for creating a sequence of ~~less-to-more-granular~~ steps of placement and netlist modification transforms, to create a ~~converging~~ design closure process meeting design performance targets.

35. (Original) The system according to claim 22, wherein all transforms have a unified view of the placement and synthesis design space.

36. (Currently amended) The system according to claim 35, wherein synthesis, timing, and placement data are concurrently available to all of said transforms, such that said

transforms modify a netlist and placement. ~~concurrently.~~

37. (Currently amended) A ~~software system for applying~~ programmable storage medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to ~~transforms for modifying~~ modify a plurality of domains ~~concurrently~~ in a design ~~space, said software system comprising:~~ space by:

~~a module for creating~~ selectively applying a sequence of ~~less to more granular~~ steps of placement and netlist modification transforms,

~~a module to evaluate~~ evaluating the impact of the sequence of steps of the of modification transforms on the design space and ~~to reject~~ rejecting evaluated ~~transforms~~ sequences that do not improve the design space, to create a ~~converging~~ design process ~~flow,~~ flow meeting design performance targets.

wherein said transforms ~~are fine grained transforms allowing~~ allow selective mixing and matching of ~~said fine grained transforms~~ the steps to optimize the placement of a circuit in a design space.

38. (Currently amended) A programmable storage medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to ~~perform a method of applying transforms for modifying~~ modify a plurality of domains ~~concurrently~~ in a design ~~space, said method comprising:creating~~ space by selectively applying a sequence of ~~fine grained~~ steps of transforms to create a ~~converging~~ design process flow resulting in meeting of design performance targets, each transform including a plurality of steps,

wherein said ~~fine-grained~~ transforms optimize the combination of the Boolean, physical and electrical aspects of a design. ~~concurrently.~~

39. (Currently amended) A programmable storage medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to ~~perform a method of applying fine-grained~~ apply transformations during placement synthesis ~~interaction, said method comprising:~~ interaction by:

~~(a)~~ creating and updating bins;

~~(b)~~ applying a plurality of transforms on a bin-based database updated by both placement and synthesis, each transform including a plurality of steps;

~~(c)~~ updating the bin-based timing, and invoking a synthesis-placement script;

~~(d)~~ selecting ~~fine-grained~~ synthesis and placement transforms;

~~(e)~~ invoking steps of the selected transforms within said script using a driver; and

~~(f)~~ applying those transforms that change the physical, electrical and Boolean logic design space ~~concurrently~~ to achieve performance targets.